Experimental Neurology

A JOURNAL OF NEUROSCIENCE RESEARCH

EDITOR-IN-CHIEF
John R. Sladek, Jr.
The Chicago Medical School

VOLUME 164, 2000

ACADEMIC PRESS
A Harcourt Science and Technology Company

Copyright © 2000 by Academic Press
All Rights Reserved

No part of this publication may be reproduced or transmitted in any form or by any means, electronic or mechanical, including photocopy, recording, or any information storage and retrieval system, without permission in writing from the Publisher. *Exceptions:* Explicit permission from Academic Press is not required to reproduce a maximum of two figures or tables from an Academic Press article in another scientific or research publication provided that the material has not been credited to another source and that full credit to the Academic Press article is given. In addition, authors of work contained herein need not obtain permission in the following cases only: (1) to use their original figures or tables in their future works; (2) to make copies of their papers for use in their classroom teaching; and (3) to include their papers as part of their dissertations.

The appearance of the code at the bottom of the first page of an article in this journal indicates the Publisher's consent that copies of the article may be made for personal or internal use, or for the personal or internal use of specific clients. This consent is given on the condition, however, that the copier pay the stated per copy fee through the Copyright Clearance Center, Inc. (222 Rosewood Drive, Danvers, Massachusetts 01923), for copying beyond that permitted by Sections 107 or 108 of the U.S. Copyright Law. This consent does not extend to other kinds of copying, such as copying for general distribution, for advertising or promotional purposes, for creating new collective works, or for resale. Copy fees for pre-2000 articles are the same as those for current articles.

0014-4886/00 $35.00

MADE IN THE UNITED STATES OF AMERICA

This journal is printed on acid-free paper.

EXPERIMENTAL NEUROLOGY

A Journal of Neuroscience Research

Editor-in-Chief: John R. Sladek, Jr.
The Chicago Medical School

Reviews

Section Editor
Marion Murray
MCP Hahnemann University

Development

Section Editor
John Parnavelas
University College London

Emanuel M. DiCicco-Bloom
University of Medicine and Dentistry of New Jersey

Michael Frotscher
University of Freiburg

Christine M. Gall
University of California, Irvine

James E. Goldman
Columbia University

Stephen Hunt
University College London

Carlos Ibanez
Karolinska Institute

Arnold R. Kriegstein
Columbia University

Susan K. McConnell
Stanford University

Seong-Seng Tan
University of Melbourne

Kathryn W. Tosney
University of Michigan

Samuel Weiss
University of Calgary

Gene Therapy and Trophic Factors

Section Editor
Scott R. Whittemore
University of Louisville

Martha C. Bohn
Northwestern University

Howard J. Federoff
University of Rochester

Itzhak Fischer
MCP & Hahnemann University

Theodoor Hagg
Dalhousie University

Franz F. Hefti
Merck Sharp & Dohme

David M. Holtzman
Washington University

Eugene M. Johnson
Washington University

William C. Mobley
University of California, San Francisco

Evan Y. Snyder
Harvard University

Joe E. Springer
University of Kentucky

Regeneration and Plasticity

Section Editor
Jerry Silver
Case Western Reserve University

Mary B. Bunge
University of Miami

Samuel David
Montreal General Hospital Research Institute

Fred H. Gage
Salk Institute

Bernice Grafstein
Weill Medical College of Cornell University

John D. Houle
University of Arkansas

Almudena Ramon-Cueto
Instituto de Biomedicina (CSIC), Valencia

Paul J. Reier
University of Florida

Dennis A. Steindler
University of Tennessee

Dennis J. Stelzner
SUNY at Syracuse

Oswald Steward
University of California, Irvine

Sally Temple
Albany Medical College

Mark H. Tuszynski
University of California, San Diego

Transplantation and Repair

Section Editor
Jeffrey H. Kordower
Rush Medical School

Krzysztof S. Bankiewicz
NINDS

Patrik Brundin
University of Lund

Timothy J. Collier
Rush Medical School

Dwaine F. Emerich
Alkermes

Ann-Charlotte Granholm-Bentley
University of Colorado

Barry J. Hoffer
NIDA

Ole Isacson
Harvard University

Shinn-Zong Lin
Tri-Service General Hospital, Taipei

Olle Lindvall
University Hospital, Lund

Lars Olson
Karolinska Institute

Marc Peschanski
INSERM

Jeffrey M. Rosenstein
George Washington University

Paul R. Sanberg
University of South Florida

Feng C. Zhou
Indiana University School of Medicine

Jens Zimmer
University of Odense

Cellular and Molecular Neuroscience

Section Editor
William J. Freed
NIMH

Richard Broadwell
United States Public Health Services

Herbert M. Geller
University of Medicine and Dentistry of New Jersey

Paul C. Letourneau
University of Minnesota

Mark P. Mattson
National Institute on Aging

Mark M. Noble
University of Utah

Ronald W. Oppenheim
Wake Forest University School of Medicine

Geoffrey Raisman
Mill Hill, London

Robert H. Roth
Yale University

Celia D. Sladek
The Chicago Medical School

Wolfgang J. Streit
University of Florida College of Medicine

John Q. Trojanowski
University of Pennsylvania

Neural Systems

Section Editor
John H. Morrison
Mt. Sinai School of Medicine

David Armstrong
Thomas Jefferson University

Georgia A. Bishop
Ohio State University

Javier DeFelipe
Instituto Cajal

James W. Geddes
University of Kentucky

Harry G. Goshgarian
Wayne State University

Glenn I. Hatton
University of California, Riverside

Steven J. Henriksen
The Scripps Research Institute

Patrick R. Hof
Mt. Sinai School of Medicine

Gloria E. Hoffman
University of Maryland

Alfredo Kirkwood
Johns Hopkins University

Teresa Milner
Cornell University

John H. Weiss
University of California, Irvine

Neurological and Psychiatric Disorders

Section Editor
Sid Gilman
University of Michigan

Roger L. Albin
University of Michigan

Raymond T. Bartus
Alkermes

Jerome Engel Jr.
University of California, Los Angeles

Myron D. Ginsberg
University of Miami School of Medicine

J. Timothy Greenamyre
Emory University

Paula Hoffman
University of Colorado

Dan McIntyre
Carleton University

Ira Shoulson
University of Rochester

Warren J. Strittmatter
Duke University

Richard J. Traystman
Johns Hopkins Medical Institutions

Anne B. Young
Harvard University

Justin A. Zivin
University of California, San Diego

Neurodegeneration

Section Editor
J. William Langston
The Parkinson's Institute

Brian H. Anderton
Institute of Psychiatry, London

M. Flint Beal
Weill Medical College of Cornell University

Gerald Cohen
Mt. Sinai School of Medicine

Stanley Fahn
Neurology Institute, New York

Caleb E. Finch
University of Southern California

John Hardy
Mayo Clinic, Jacksonville

James Hope
MRC Neuropathogenesis Unit

Kurt Jellinger
Lainz Hospital, Vienna

Colin Masters
University of Melbourne

Edith McGeer
University of British Columbia

Yoshikuni Mizuno
Juntendo University Medical School

Rudolph Tanzi
Massachusetts General Hospital

Founding Editor: William F. Windle

59 522HI XL 440
11/00 31249-200

Contents of Volume 164

Number 1, July 2000

Guest Editorial

Jens Zimmer and Jeffrey H. Kordower 1

Gene Delivery

Krys S. Bankiewicz, Jamie L. Eberling, Malgorzata Kohutnicka, William Jagust, Phillip Pivirotto, John Bringas, Janet Cunningham, Thomas F. Budinger, and Judith Harvey-White. Convection-Enhanced Delivery of AAV Vector in Parkinsonian Monkeys; *In Vivo* Detection of Gene Expression and Restoration of Dopaminergic Function Using Pro-drug Approach 2

Jean-Charles Bensadoun, Nicole Déglon, Jack L. Tseng, Jean-Luc Ridet, Anne D. Zurn, and Patrick Aebischer. Lentiviral Vectors as a Gene Delivery System in the Mouse Midbrain: Cellular and Behavioral Improvements in a 6-OHDA Model of Parkinson's Disease Using GDNF 15

Bas Blits, Paul A. Dijkhuizen, Gerard J. Boer, and Joost Verhaagen. Intercostal Nerve Implants Transduced with an Adenoviral Vector Encoding Neurotrophin-3 Promote Regrowth of Injured Rat Corticospinal Tract Fibers and Improve Hindlimb Function 25

Bettina Wiesenhofer and Christian Humpel. Lipid-Mediated Gene Transfer into Primary Neurons Using FuGene: Comparison to C6 Glioma Cells and Primary Glia 38

Neurotrophins and GDNF; Induction and Trophic Effects

Brian R. Ickes, Therese M. Pham, Linda A. Sanders, David S. Albeck, Abdul H. Mohammed, and Ann-Charlotte Granholm. Long-Term Environmental Enrichment Leads to Regional Increases in Neurotrophin Levels in Rat Brain 45

Mara Bresjanac and Gregor Antauer. Reactive Astrocytes of the Quinolinic Acid-Lesioned Rat Striatum Express GFRα1 as Well as GDNF *in Vivo* 53

L. C. Costantini and O. Isacson. Immunophilin Ligands and GDNF Enhance Neurite Branching or Elongation from Developing Dopamine Neurons in Culture 60

Hans R. Widmer, Benoît Schaller, Morten Meyer, and Rolf W. Seiler. Glial Cell Line-Derived Neurotrophic Factor Stimulates the Morphological Differentiation of Cultured Ventral Mesencephalic Calbindin- and Calretinin-Expressing Neurons 71

Morten Meyer, Jens Johansen, Jan-Bert Gramsbergen, Teit E. Johansen, and Jens Zimmer. Improved Survival of Embryonic Porcine Dopaminergic Neurons in Coculture with a Conditionally Immortalized GDNF-Producing Hippocampal Cell Line 82

Improving Graft Neuronal Survival

Roger F. Castilho, Oskar Hansson, and Patrik Brundin. FK506 and Cyclosporin A Enhance the Survival of Cultured and Grafted Rat Embryonic Dopamine Neurons 94

Oskar Hansson, Roger F. Castilho, Gabriele S. Kaminski Schierle, Jenny Karlsson, Pierlugi Nicotera, Marcel Leist, and Patrik Brundin. Additive Effects of Caspase Inhibitor and Lazaroid on the Survival of Transplanted Rat and Human Embryonic Dopamine Neurons 102

Ulrika Mundt-Petersen, Åsa Petersén, Mia Emgård, Stephen B. Dunnett, and Patrik Brundin. Caspase Inhibition Increases Embryonic Striatal Graft Survival 112

J. Sautter, G. U. Höglinger, W. H. Oertel, and C. D. Earl. Systemic Treatment with GM1 Ganglioside Improves Survival and Function of Cryopreserved Embryonic Midbrain Grafted to the 6-Hydroxydopamine-Lesioned Rat Striatum 121

Nina Törnqvist, Lars Björklund, Per Almqvist, Lars Wahlberg, and Ingrid Strömberg. Implantation of Bioactive Growth Factor-Secreting Rods Enhances Fetal Dopaminergic Graft Survival, Outgrowth Density, and Functional Recovery in a Rat Model of Parkinson's Disease 130

Neural Graft Function and Graft-Host Interaction

James R. Coleman, C. J. Gibson, G. D. Fourqurean, and Karen C. Ross. Tectal Graft Modulation of Audiogenic Seizures in Long–Evans Rat 139

S. J. Cragg, D. J. Clarke, and S. A. Greenfield. Real-Time Dynamics of Dopamine Released from Neuronal Transplants in Experimental Parkinson's Disease..... 145

Ingrid Strömberg, Jan Kehr, Beth Andbjer, and Kjell Fuxe. Fetal Ventral Mesencephalic Grafts Functionally Reduce the Dopamine D2 Receptor Supersensitivity in Partially Dopamine Reinnervated Host Striatum 154

Zoe Puschban, Regina Waldner, Klaus Seppi, Nadia Stefanova, Christian Humpel, Christoph Scherfler, Marc Levivier, Werner Poewe, and Gregor K. Wenning. Failure of Neuroprotection by Embryonic Striatal Grafts in a Double Lesion Rat Model of Striatonigral Degeneration (Multiple System Atrophy) 166

Jinsheng Zeng, Bengt Mattsson, Mette K. Schulz, Barbro B. Johansson, and Jens Chr. Sørensen. Expression of Zinc-Positive Cells and Terminals in Fetal Neocortical Homografts to Adult Rat Depends on Lesion Type and Rearing Conditions..... 176

Neural Precursors and Cell Lines

Cecilia Eriksson, Cecilia Ericson, Monte A. Gates, and Klas Wictorin. Long-Term, EGF-Stimulated Cultures of Attached GFAP-Positive Cells Derived from the Embryonic Mouse Lateral Ganglionic Eminence: *In Vitro* and Transplantation Studies 184

F. C. Zhou, M. R. Kelley, Y. H. Chiang, and P. Young. Three to Four-Year-Old Nonpassaged EGF-Responsive Neural Progenitor Cells: Proliferation, Apoptosis, and DNA Repair 200

Hitoo Nishino, Hideki Hida, Norie Takei, Michiko Kumazaki, Keiya Nakajima, and Hiroko Baba. Mesencephalic Neural Stem (Progenitor) Cells Develop to Dopaminergic Neurons More Strongly in Dopamine-Depleted Striatum than in Intact Striatum..... 209

Thor Ostenfeld, Maeve A. Caldwell, Karen R. Prowse, Maarten H. Linskens, Eric Jauniaux, and Clive N. Svendsen. Human Neural Precursor Cells Express Low Levels of Telomerase *in Vitro* and Show Diminishing Cell Proliferation with Extensive Axonal Outgrowth following Transplantation 215

In Vitro and In Vivo Lesion Models

Jan Storgaard, Brian T. Kornblit, Jens Zimmer, and Jan Bert P. Gramsbergen. 3-Nitropropionic Acid Neurotoxicity in Organotypic Striatal and Corticostriatal Slice Cultures Is Dependent on Glucose and Glutamate..... 227

Romuald Wroblewski, Godfried M. Roomans, and Elena N. Kozlova. Effects of Dorsal Root Transection on Morphology and Chemical Composition of Degenerating Nerve Fibers and Reactive Astrocytes in the Dorsal Funiculus..... 236

Number 2, August 2000

J. Sanchez-Ramos, S. Song, F. Cardozo-Pelaez, C. Hazzi, T. Stedeford, A. Willing, T. B. Freeman, S. Saporta, W. Janssen, N. Patel, D. R. Cooper, and P. R. Sanberg. Adult Bone Marrow Stromal Cells Differentiate into Neural Cells *in Vitro* 247

Dongmei Jiang, Garnik Akopian, Ye-Shih Ho, John P. Walsh, and Julie K. Andersen. Chronic Brain Oxidation in a Glutathione Peroxidase Knockout Mouse Model Results in Increased Resistance to Induced Epileptic Seizures 257

Tetsuhito Murata, Naoto Omata, Yasuhisa Fujibayashi, Atsuo Waki, Norihiro Sadato, Mitsuyoshi Yoshimoto, Yuji Wada, and Yoshiharu Yonekura. Posthypoxic Reoxygenation-Induced Neurotoxicity Prevented by Free Radical Scavenger and NMDA/non-NMDA Antagonist in Tandem as Revealed by Dynamic Changes in Glucose Metabolism with Positron Autoradiography..... 269

A. G. Rabchevsky, I. Fugaccia, A. F. Turner, D. A. Blades, M. P. Mattson, and S. W. Scheff. Basic Fibroblast Growth Factor (bFGF) Enhances Functional Recovery Following Severe Spinal Cord Injury to the Rat 280

Yasushi Iwashita, James W. Fawcett, A. J. Crang, Robin J. M. Franklin, and William F. Blakemore. Schwann Cells Transplanted into Normal and X-Irradiated Adult White Matter Do Not Migrate Extensively and Show Poor Long-Term Survival 292

Petter Förander, Kerstin Krieglstein, Stine Söderström, and Ingrid Strömberg. Mutual Induction of TGFβ1 and NGF after Treatment with NGF or TGFβ1 in Grafted Chromaffin Cells of the Adrenal Medulla 303

Hervé Boutin, François Dauphin, Philippe Jauzac, and Eric T. MacKenzie. Exofocal Alterations in Opioidergic Receptor Densities Following Focal Cerebral Ischemia in the Mouse 314

Anna Mura, Joram Feldon, and Matti Mintz. The Expression of the Calcium Binding Protein Calretinin in the Rat Striatum: Effects of Dopamine Depletion and L-DOPA Treatment 322

Laura Calzà, Monica Pozza, Rossana Arletti, Enrico Manzini, and Tomas Hökfelt. Long-Lasting Regulation of Galanin, Opioid, and Other Peptides in Dorsal Root Ganglia and Spinal Cord during Experimental Polyarthritis 333

Yan-Shen Deng, Jin-Hua Zhong, and Xin-Fu Zhou. Effects of Endogenous Neurotrophins on Sympathetic Sprouting in the Dorsal Root Ganglia and Allodynia Following Spinal Nerve Injury 344

M. A. Cenci and P. Kalén. Serotonin Release from Mesencephalic Raphe Neurons Grafted to the 5,7-Dihydroxytryptamine-Lesioned Rat Hippocampus: Effects of Behavioral Activation and Stress 351

Hsiao-Tzu Ni, Rebecca R. Merica, Stephen R. Spellman, Jue-Mei Wang, and Walter C. Low. Visualization of Antigen-Specific T Cell Activation *in Vivo* in Response to Intracerebral Administration of a Xenopeptide 362

T. FitzGibbon, S. G. Solomon, and A. K. Goodchild. Distribution of Calbindin, Parvalbumin, and Calretinin Immunoreactivity in the Reticular Thalamic Nucleus of the Marmoset: Evidence for a Medial Leaflet of Incertal Neurons 371

U. Bongenhielm, C. A. Nosrat, I. Nosrat, J. Eriksson, J. Fjell, and K. Fried. Expression of Sodium Channel SNS/PN3 and Ankyrin$_G$ mRNAs in the Trigeminal Ganglion after Inferior Alveolar Nerve Injury in the Rat 384

Shin Yasuda, Nobuya Ishida, Akiko Higashiyama, Shigeru Morinobu, and Nobumasa Kato. Characterization of Audiogenic-Like Seizures in Naive Rats Evoked by Activation of AMPA and NMDA Receptors in the Inferior Colliculus 396

Tomosada Sugimoto, Yue Ling Li, Hiroto Kishimoto, Masako Fujita, and Hiroyuki Ichikawa. Compensatory Projection of Primary Nociceptors and c-*fos* Induction in the Spinal Dorsal Horn following Neonatal Sciatic Nerve Lesion 407

Sarah B. Berman, Simon C. Watkins, and Teresa G. Hastings. Quantitative Biochemical and Ultrastructural Comparison of Mitochondrial Permeability Transition in Isolated Brain and Liver Mitochondria: Evidence for Reduced Sensitivity of Brain Mitochondria 415

Bryan C. Hains, Kathy M. Chastain, Alex W. Everhart, David J. McAdoo, and Claire E. Hulsebosch. Transplants of Adrenal Medullary Chromaffin Cells Reduce Forelimb and Hindlimb Allodynia in a Rodent Model of Chronic Central Pain after Spinal Cord Hemisection Injury 426

Abstracts 439

Author Index for Volume 164 469